ISSN (print) 0093-4666 © 2012. Mycotaxon, Ltd. ISSN (online) 2154-8889

MYCOTAXON

http://dx.doi.org/10.5248/120.149

Volume 120, pp. 149–155 *April–June 2012*

Octaviania violascens: a new sequestrate bolete from Thailand

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Abstract — *Octaviania violascens* sp. nov. is proposed for a new sequestrate bolete from Khao Yai National Park, Nakhon Ratchasima Province, Thailand. A comprehensive description and illustrations are provided.

Key words — *Basidiomycota*, truffle, *Octavianiaceae*

Introduction

While walking along an elephant trail collecting mushrooms in a bamboo grove in Khao Yai National Park, Nakhon Ratchasima Province, Thailand, we encountered a rose-colored fungus where recent rain had washed away the topsoil. The distinctive characteristics of this species, besides the rose color of its basidiocarps, were that it bruised deep reddish violet, contained non-glutinous gleba, and had clamp connections in the peridial layer and basidia containing only two highly ornamented spores. Its micromorphology clearly placed it in *Octaviania* and it is the first record of this genus from Thailand. *Octaviania* is included in the group of sequestrate basidiomycetes called truffles. In Thailand 8 species of sequestrate fungi have been reported, including *Arcangeliella rosea* (Harkn.) Zeller & C.W. Dodge (Ellingsen 1982), *A. beccarii* (Petri) Zeller & C.W. Dodge (Chandrasrikul et al. 2008), *Descomyces* cf. *albellus* (Massee & Rodway) Bougher & Castellano (Dissing 1963, Ellingsen 1982), *Mycoamaranthus cambodgensis* (Pat.) Trappe, et al. (Chandrasrikul et al. 2007, 2008, Lumyong et al. 2003), *Radiigera tropica* Orihara & T. Kasuya, and three other unknown species from Dissing (1963) in the genera *Hymenogaster*,

Leucogaster, and *Melanogaster*. This paper describes a newly discovered species, *Octaviania violascens,* from Thailand.

Materials & methods

Collection site: The study site is in a bamboo grove, in a secondary forest near the 28 km marker post along the road from the northern entrance in Khao Yai National Park, Nakhon Ratchasima Province, Thailand.

Fungal materials: Dried specimens are deposited in the BIOTEC Bangkok Herbarium (BBH).

Morphology: Macromorphological data were recorded from dried specimens using an Olympus model XZ30 stereomicroscope. Micromorphological data were recorded from dried specimens using an Olympus model BX51 microscope. Drawings were made using an Olympus Camera Lucida model U–DA. Measurements and drawings were made from slide preparations stained with cotton blue, Melzer's reagent, or 3% potassium hydroxide. The following abbreviations are used for chemical reactions: IKI (Melzer's reagent, with IKI– = non–amyloid and non–dextrinoid; IKI+ = amyloid or dextrinoid), KOH (3% potassium hydroxide), and CB (cotton blue; CB+ = cyanophilous; CB(+) = weakly cyanophilous; CB– = acyanophilous). Basidium width was measured at the broadest part, and basidium length was measured from the apex (sterigmata excluded) to basal septum. Color terms and notations in parentheses follow Kornerup and Wanscher (1963). Spore statistics include: x = the arithmetic mean of the spore length by spore width (± standard deviation) for n spores measured; Q = the quotient of length and width in any one spore, indicated as a range of variation in n spores measured; Qm = the mean of Q–values (± standard deviation). Ultrastructures were recorded from dried specimens using a Hitachi S-3400N scanning electron microscope.

Taxonomy

Octaviania violascens Choeyklin, Boonprat. & Somrith., **sp. nov.** Plates 1–3

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Differt a O. purpurea, *absque columella et rhizomorpha, loculus rotundatus, spora verruca angulari, basidia bispora pariete crasso; praesentia fibularum et cellularum spheropedunculatarum et hypharum laticiferarum.*

Type – thailand. Nakhon Ratchasima, Pak Chong district, Khao Yai National Park, 28 km. marker post (*Bambusa* spp. forest), 14°30′59.47″N 101°22′08.29″E, 23 August 2010, coll. Rattaket Choeyklin & Sujinda Sommai, RCK 00093 (**Holotype** BBH 30342).

Etymology – *violascens* (Latin) = turning violet.

Basidiocarps 9–18 mm tall × 12–22 mm wide (dried specimens), ovoid, subglobose to turbinate, white to cream colored near base, lumpy or folded on the upper part; smooth to cracking to form squamules, the squamules reddish grey to greyish rose (12B2–3), staining reddish violet to deep violet (18C–D8) where bruised or cut; dull, dry, hard and cartilaginous. Peridium thin, 0.5–0.6 mm diam., white, quickly changing from violet white to pale violet (16A3–4) when cut. Gleba lacunate, 0.5–1 mm diam., locules filled with powdery brown

Plate 1: *Octaviania violascens*. 1. Basidiocarps in various shapes; 2. Peridial layer cracking to form squamules and deep violet stains where bruised; 3. Gleba lacunate, quickly changing to violet brown when cut, basidiocarps without rhizoid (holotype). Bar = 10 mm.

spores when dried, dark brown when fresh, solid when fresh and with a hollow central cavity when dried, watery, quickly changing to violet brown (11F8) when cut; sterile tissue between locules fibrous, white but immediately changing to reddish violet to deep violet when bruised (18C–D8). Latex absent. Columella absent. Odor not distinctive.

Basidiospores without spines (11–)12–15(–19) × 11–14(–15) µm (x = 13.84 ± 1.53 × 12.44 ± 1.16 µm, Q = 1.0–1.46, Qm = 1.09 ± 0.11, n = 25); with spines (12–)15–17(–18) × (10–)15–20 µm (x = 15.79 ± 1.36 × 16.40 ± 2.14 µm, Q = 0.67–1.50, Qm = 0.98 ± 0.15), orthotropic and heterotropic, symmetric and asymmetric, globose to subglobose, walls 2.0–2.5 µm thick, pale yellowish brown, golden-brown, brown to dark brown in water and 3% KOH, IKI+ (weakly dextrinoid), CB–, spore ornamentation echinulate to conical spines, 1–2 µm tall × 2 µm wide at base × 1 µm wide at apex, most apical spines acute

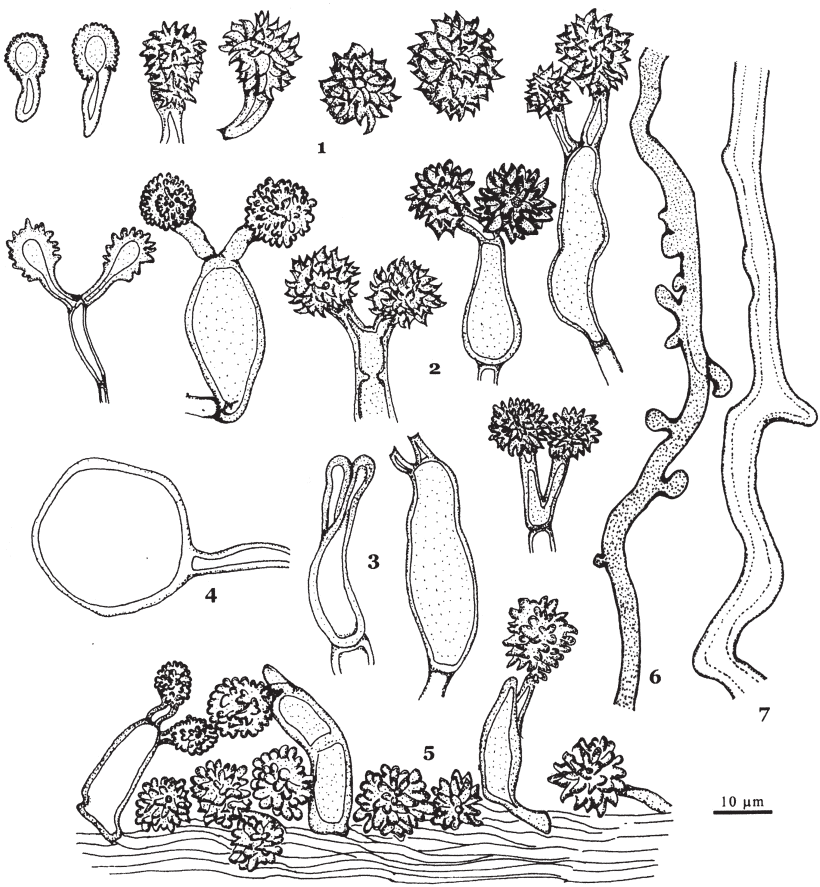

Plate 2: *Octaviania violascens* (holotype). 1. Basidiospore formation; 2. 2-spored basidia; 3. Basidia shapes; 4. Spheropedunculate cell from peridial context; 5. Hymenium with basidia; 6. Oleiferous hyphae; 7. Skeletal hyphae. Bar = 10 µm.

but some blunted or slightly bent, hyaline in 3% KOH and water, IKI+ (weakly dextrinoid), CB+; pedicel 6–10 × 3 µm, walls 1–1.5 µm thick, pale yellowish-brown. Basidia (12.5–)20–31(–35) × (5–)7.5–15 µm, 2–spored, lageniform to fusoid, walls >1 µm thick, hyaline when young to pale yellowish brown to brown when mature in water and KOH, IKI–, CB+, basally septate; sterigmata 7–8 µm tall × 3 µm wide, walls 1 µm thick, pale brown in water and 3% KOH, IKI–, CB+, septa present at the sterigmal base. Peridial context 170–300 µm diam., containing two types of hyphae consisting of oleiferous and binding hyphae; oleiferous hyphae 3–4 µm wide, thin-walled, brown in water and 3%

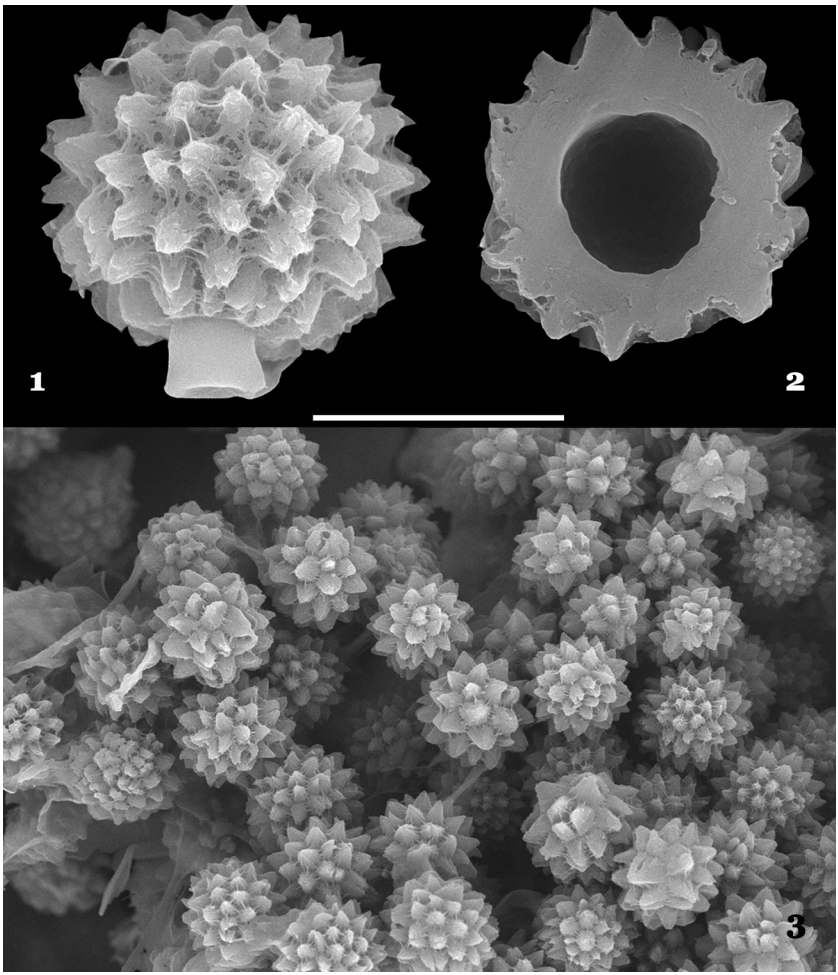

Plate 3: *Octaviania violascens* (holotype): scanning electron micrographs of spores. 1. Mature basidiospore, 2. Basidiospore wall, 3. Basidiospores variation, Bar 1–2 = 10 µm, 3 = 3 µm

KOH, IKI–, CB+; binding hyphae 4–6 µm width, thick-walled, walls 1–1.5 µm thick, hyaline in water and 3% KOH, IKI–, CB+, and pinkish when stained with phloxine. Sphaeropedunculate cells 27.5–30 × 27.5–30 µm, embedded in the peridial context, pedicel 7 × 2 µm, ovoid, thick-walled, hyaline, IKI–. Subhymenium IKI+ (weakly dextrinoid). Tramal plate 25–30 µm diam., thin-walled, hyaline, IKI–. Peridiopellis of repent hyphae, interwoven, thin-walled, hyaline, IKI–. Sterile tissues that separate the locules are identical to the tramal plate. Clamp connections present only in the peridial tissue.

Ecology & distribution: Solitary to gregarious or in small clusters, subhypogeous to hypogeous, in sandy soil in a *Bambusa* spp. (*Bambusaceae*) forest, in open secondary forest. Thailand, Nakhon Ratchasima Province, Khao Yai National Park, 28 km marker post.

Discussion

Octaviania violascens may be diagnosed by its echinulate spores with conical spines and thick-walled 2-spored basidia. The new species is most similar to *O. purpurea* Coker & Couch (Coker & Couch 1928) but differs in the texture of the gleba, absence of a columella and rhizomorphs, spore shape, colour, and ornamentation, presence of laticiferous hyphae, and basidia shape and sterigmata number (Table 1). Spheropedunculate cells in the peridial context and clamp connections found in *O. violascens* are absent in *O. purpurea* (Table 1).

Heliogaster Orihara & K. Iwase also produces an empty-chambered nonglutinous gleba, but unlike *Octaviania* its gleba is soft, not rubbery and its peridium composed of filamentous hyphae (not partly inflated hyphae with isodiametric cells) and spores with a perisporium. In the absence of DNA analyses, we retain *O. violascens* within *Octaviania* based on morphology.

Table 1. Morphological characters in *Octaviania violascens* and *O. purpurea*.

Morphology	*O. violascens*	*O. purpurea*
Sporocarp texture	Rubbery	Not reported
Spore ornamentation	Echinulate with conical spines	Angular warts
Spore shape	Globose	Subglobose
Spore color	Pale yellowish brown to brown	Yellowish brown to dark brown
Basidia	2-spored, thick-walled	1-spored, thin-walled
Basidial shape	Lageniform to fusoid	Jug-shaped
Basidial size	~20–31 × 7.5–15 µm	30–44 × 5.5–7.8 µm
Clamp connection	Present	Absent
Spheropedunculate cells	Present	Absent
Rhizoid & columella	Absent	Present
Locules	Round	Labyrinthiform

Acknowledgments

We express appreciation to Michael Castellano and Teresa Lebel for reviewing this paper. We thank Tim Flegel for reviewing English. We are grateful Ellen Bloch (curator of New York Botanical Garden) for the loan of *Octaviania purpurea* Coker & Couch #780569. This study was funded by BIOTEC, Thailand (TRF/BRT – The biodiversity Research and Training Program grant #BRT_R650001) for field survey. We appreciate the Department of National Parks, Wildlife and Plant Conservation, Ministry of Natural Resources and Environment for permitting collecting inside Khao Yai National Park.

Literature cited

Chandrasrikul A, Phanichapol D, Boonthavikoon T, Chalermpong A. 2007. Mushrooms in Thailand. The Royal Institute Press, Thailand. 272 p.

Chandrasrikul A, Suwanarit P, Sangwanit U, Morinaga T, Nishizawa Y, Murakami Y. 2008. Diversity of mushrooms and macrofungi in Thailand. Kasetsart University, Bangkok. 514 p.

Coker WC, Couch JN. 1928. The gasteromycetes of the eastern United States and Canada. Chapel Hill The University of North Carolina Press, North Carolina. 508 p.

Dissing H. 1963. Studies in the flora of Thailand 25: discomycetes and gasteromycetes. Dansk Botanisk Arkiv 23: 117–130.

Ellingsen HJ. 1982. Some gasteromycetes from northern Thailand. Nordic Journal of Botany 2: 283–285. http://dx.doi.org/10.1111/j.1756-1051.1982.tb01190.x

Kornerup A, Wanscher JH. 1963. Methuen handbook of colour. Methuen & Co Ltd press, Great Britain. 224 p.

Lumyong S, Sanmee R, Lumyong P, Yang ZL, Trappe JM. 2003. *Mycoamaranthus cambodgensis* comb. nov., a widely distributed sequestrate basidiomycete from Australia and southeastern Asia. Mycological Progress 2: 323–325. http://dx.doi.org/10.1007/s11557-006-0069-9

Orihara T, Kasuya T, Phongpaichit S, Dissara Y. 2008. *Radiigera tropica* (*Geastraceae*, *Geastrales*), a new species from a tropical rain forest of Thailand. Mycotaxon 105: 111–117.

Orihara T, Sawada F, Ikeda S, Yamato M, Tanaka C, Shimomura N, Hashiya M, Iwase K. 2010. Taxonomic reconsideration of a sequestrate fungus, *Octaviania columellifera*, with the proposal of a new genus, *Heliogaster*, and its phylogenetic relationships in the Boletales. Mycologia 102: 108–121. http://dx.doi.org/10.3852/08-168